UNITED STATES, et al.

v.

INEOS ABS (USA) CORPORATION, et al.

C.A. No. 1:09-CV-545

EXHIBITS TO MOTION FOR ENTRY OF FIRST AMENDMENT

EXHIBIT 2

COMMENT OF MR. AND MRS. RICHARD CHALLIS

<richardchallis6@gmail.com> 11:04 AM (23 hours ago)

To pubcomment-ees.

Objection to INEOS ABS Addyston, Ohio and Their Predecessors; My Family Victims Since 1981

Dear Sirs:

The person most responsible for the 3.1 million fine was Senator Mitch McConnell. We asked the Kentucky connection in 2005 to investigate the Addyston, Ohio plastics plant. In contrast to the Hamilton County Ohio EPA, Senator McConnell's Independent Ohio Toxicologist, Paul Koval, found 50 times more cancer causing emission toxins than acceptable according to EPA standards.

I am hypersensitive to butadiene, and I have had over 15,000 bouts since 1981. Over this time period, however, I have had no bouts on major holidays. Our house is located 11 miles from the plant. My wife suffers a raw nose and nose bleeds from the styrene emissions. They are not, however, at the same time as my bouts.By e-mail, I informed the plant site manager Eric Cassisa, that although,there has been at least a 70% reduction, the pollution is still much too high. Mr. Cassida, like all managers at the plant, did not live in Addyston, Ohio. He quit his job in November 2014 at INEOS ABS, and he took his family back to France.

There is still dangerous toxic waste in Addyston. There is even Styrofoam buried in Addyston, This stopped Ohio from beginning a housing development there. For information on this plant read the article about the Addyston, plant by Steve Lerner. We have many documents and correspondence which explain our objections. In fact, we have kept a daily journal for the past ten years.

Sincerely,

Richard and Emily Challis

7/18/14

Manager: Eric Cassisa

Since 1981, I along with my family, wife, Emily, a former Conner High School French teacher, and my son, Jack, a Yale PhD degree in physics, have been terrorized, especially in our home, by this Addyston, Ohio plastics plant of many names.

Our friend of many years, Senator Mitch McConnell, good there is an election this year, was responsible in obtaining the expert services of Ohio toxicologist, Paul Koval. His report contradicted the local Hamilton County EPA and led, along with media investigations, to the eventual fine of INEOS ABS. Emily and I objected, in the addendum to the settlement that Kentucky was not included.

Emily and I are happy for England's emission standards that forced native son, James Radcliffe to relocate. Also, we admire Duke Energy for answering our inquiry and refuting many of your company's malfunction e-mails. Even though I called many of the PAG members a rubber-stamp group the last time I was there. I expect new members, will weigh-and consider the harm that your company has caused, to our region's health conditions. I admired Sandy Marshall, the former manager of Lanxess, for telling me,"I am sorry."

"Since you are the new manager, I am including an article about the plastics plant by Steve Lerner, Subsequently, this article is included in his book: SACRIFICE ZONES: THE FRONT LINES OF TOXIC CHEMICAL EXPOSURE IN THE UNITED STATES.

Let us hope, the bad guys lose again this time.

Sincerely,

Dick Challis

8/5/14

Eric.Cassisa@ineos.com
to me
Dear Mr. Challis,

I hope this message finds you and your family in good form. I apologize for the late answer but your message arrived when I was on vacation.
I would like to take this opportunity to update you on the operations at the Addyston plant that I have had the honor of leading for the last two years.

In 2013, the total emissions to the air from the plant have been reduced by 26 % vs 2012. This represents an overall 32% reduction from 2005, the period you are referring to.

Looking at butadiene in particular, the average emissions measured at the new (since 2012) measuring station have been 0.3 ppb. The new measuring station is closer and more typically downwind of the flare than the original monitor and the Meredith Hitchens Elementary School.
We consider this to be very low and again represents a 63% reduction versus the period you are referring to.

We are happy to report these numbers regularly to the PAG when many questions and clarifications are asked by members of the community.
We consider that the plant is operating in a markedly improved manner and we are trying our best to minimize our impact on the environment.

Sincerely yours,

Eric CASSISA
Site Director
INEOS ABS (USA) Corp.
356 Three Rivers Parkway
Addyston, Ohio 45001
Phone: +1 513 467 2208
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www.ineos.com

8/5/14

Richard Challis <richardchallis6@gmail.com>
to Eric.Cassisa
Manager: Eric Cassisa,

Yes, my bouts are down over 70%, I can dream again, and now a few Music Hall patrons, including myself, can enjoy the performances. Over 60 years of horrible suffering and deaths, by the thousands in three states, caused by this plastic's plant emissions. You are honored by reducing suffering and death? It is a meager beginning.

Sincerely,

Dick and Emily Challis

PAG Members

Richard Challis <richardchallis6@gmail.com> 8/25/14

to To:, Amy, Beth, Bob, Brad, Brian, Captain, Chris, Dan, Dan, Danny, Dave, Deb, Denn is, Don, Doug, Duane, Ed, Eric, Frank, Fred, Gerald, Greg, Jack, Jeff

Emily and I have recently returned from the 70th anniversary, Normandy, France festivities, honoring the Americans who died at D-Day and the Normandy Province campaign in World War II. My Uncle,1st Lieutenant Lewis Challis, was killed here and honored at the festivities. Also, the Honorable Senator Mitch McConnell, 69 years after my uncle's death, obtained his medals that he richly deserved. Normandy has wonderful air to breathe.

Senator McConnell is the same very pro-businessman, who when Emily and I asked him, obtained the expert independent Ohio Toxicologist, Paul Koval, to investigate the Addyston, Ohio plastic plant's toxic emissions. Koval's devastating report, 50 times over the acceptable cancer rate and negatively contributing to regional health (my over nine years daily log). There is hope that in the near future, the wrongful deaths, sufferings and the extreme exploitation of the Addyston citizens will result in a large settlement for the City of Addyston, so we can breathe cleaner air.

A few of the many exploitations are: For many years the number of employees from Addyston have been at a bare minimum; Almost 90 percent of the previous foundry workers were from Addyston. In 2007, of the 407 plant employees only 4 employees were from Addyston, less than 1%. Many of the employees are from Indiana, to the west of the plant. Recently, in the INEOS news letter the employee featured was from Addyston. She was an African American woman. How many African Americans are employed at INEOS and how many are in management? Why doesn't management and their families live in Addyston? There are strong indications that Addyston's standard of living and property values are lowered because of waste material and emissions from the plant. Why?

I am enclosing my previous correspondence with Manager, Eric Cassisa and an attachment from Steve Lerner. Duke Energy has refuted some of the malfunction e-mails from INEOS. Authorities have stated that the PAG meeting give positive certification to the plant's activities, These are fellow Americans you represent!

Still victims and fighting injustice,
Dick and Emily Challis

8/27/14

Theobald, Chris <Chris.Theobald@fmr.com>

to me

Hello, I hope all is well . My name is Chris Theobald, and I had my house boat located in Catalina Harbour in Addyston, Ohio for years. I no longer am down there in Addyson , but I know that in years past the owners of the marina would tell stories how they could not dredge the old side(behind the McDonald's) of their marina due to toxic waste from the plant. They would say that the plant would give them money to stayed closed. I understand your fight to get them to clean up the area, but you might see if you could get soil samples from the old side of that marina to show the contamination. Have a good day!

8/27/14

Richard Challis <richardchallis6@gmail.com>

to Chris

Chris,

Your informational feedback is very interesting. In order for this many named plastics company to have a past and present massive pollution problem, there has to be a money-trail of corruption.

Thanks, you show there are concerned PAG members.

10/20/14

to Chris

Chris,
Thanks for your information about the probable waste behind McDonalds. I tried to be allowed soil samples from this area and asked permission from Steve Todd, the manager, at Catalina Harbor, Addyston. He was incensed at my request and said his guests were not close to any waste. I asked him if their were any payoffs not to dredge in the dangerous area. I am sorry, I mentioned your name. Because he said that you owed him money and made-up the story. This man is definitely lying.

I am hoping that Senator McConnell will help again after the election.

Thanks again for your help.

Dick

10/21/14

Theobald, Chris <Chris.Theobald@fmr.com>
to me

For too long that plant has wrecked local communities and livelihood. I do not owe Steve any money nor do I wish any ill will, and throughout the years I boated there and had fond memories. Everyone knows that smell! Every time I look back and I could remember watching children playing in that area behind McD, and always thinking in the back of my head that it was not safe. I can't go back in the past to say something, but in the future I hope that one day it will be exposed for what it is. He will never let samples be taken and he knows what's in that ground. Thanks for fighting the fight. Thanks Chris.

CHEMICAL CONTAMINATION IN FENCELINE COMMUNITIES

Addyston, Ohio: The Plastics Plant Next Door

By Steve Lerner

Bernard "Buzz" Bowman, Jr. is proud of his antiques collection. He has 3,000 antique toy cars and trucks on shelves in his basement in Addyston, Ohio. But this is just the tip of the iceberg. His yard is full of dozens of old-fashioned gasoline pumps and stashed in his basement is a lovingly restored doctor's one-horse sleigh, upholstered in crushed red velvet and sporting a black convertible canopy that snaps into place with well-oiled precision. "We're on the map," he says, pointing out a designation of his museum on a local tourist map. He also has a write-up in a book that features attractions along Route 50, the winding River Road that snakes through this West Side factory town located on the banks of the Ohio River 12 miles from downtown Cincinnati on the Ohio/Kentucky state line.

Lanxess Plant, Addyston, OH
Photo: Steve Lerner

Addyston, population 1,200, is also on the map because of toxics problems that state officials and residents say come from the 130-acre Lanxess Corp. plastics plant (formerly owned by Monsanto and Bayer) built across the street from the elementary school and just a few blocks from the Bowman residence. In December, 2005, the school was closed after elevated levels of butadiene and acrylonitrile were discovered by monitoring equipment installed on the roof of the building. "This is cancer valley," asserts Buzz Bowman, whose wife, Carol Bowman, died recently of lymphoma. Her oncologist described her lymphoma as "an environmental cancer" but refused to speculate as to whether or not it might have been caused by living next to a plastics plant all her life. This infuriated Buzz's daughter, Lynn Bowman, 52: **"Do they think we are stupid? My mother died of an environmental cancer and we live right across from a chemical plant. In years to come they will find out that it was caused by the plant,"** she predicts. "The air pollution had a lot to do with it. It killed my mother," she charges. "It is amazing what big corporations get away with," she adds. Before she died Carol Bowman – known locally as the "candy lady" for the fudge she baked – joined other residents in protesting chemical releases from the plant. She said the protests came too late to prevent her illness but perhaps they would save others, her daughter recalls.

Bernard and Lynn Bowman
Photo: Steve Lerner

Sitting on the couch in her living room, with a box of Kleenex handy, Lynn Bowman describes what it is like to live next to a plant that put out 224,000 pounds of toxic chemicals including butadiene, styrene, and acrylonitrile in 2005; and legally released 1.6 million pounds of particulates and toxic chemicals including 813,000 pounds of sulfur dioxide, 370,000 pounds of nitrogen oxide, 102,000 pounds of volatile organic compounds, and 233,000 pounds of particulates in 2003.[1] "The smell bothers me. I get allergies and I can't breathe through my nose. On bad days it just about chokes you. It burns my eyes and nose and I get frequent nose bleeds. But then when we go for a trip and get out of town it clears up until we come back," Lynn Bowman notes. Releases from the plant tend to be most intense at night when she gets off work late from a job she holds in town, Bowman reports.

"They think we are a bunch of ignorant hillbillies," Bowman says with anger rising in her voice. "Well, don't let this blond hair fool you. I'm no fool. I know what is going on here. The smell from the plant makes us

sick. It gives me a headache every day of my life," she adds. Bowman says she has to keep the windows of the house closed because of the air pollution from the plant: "It keeps us from going out sometimes." And periodically there is a white dust that covers her car or a kind of plastic sap that is hard to scrape off.

Ironically, when an inspector from the Environmental Protection Agency visited the Bowman home it was not to discuss air pollution coming from the Lanxess plant. Instead the regulator wanted to know if Buzz Bowman's antique gas pumps were connected to underground gas storage tanks. When Bowman demonstrated that the gas pumps were antiques and connected to nothing he suggested that the regulator could more profitably use his time looking into the source of the odors coming from the Lanxess plant across the road.

The Bowmans are not alone in worrying about health effects from the plant. "This is a lovely community that is being poisoned," observes Betsy Eckert, 64, whose family has lived since the 1820s a few miles from the plant in Sayler Park.[2] Eckert, the Bowmans, and a number of other residents joined together to form the West Side Action Group to force Lanxess to appoint a new plant manager, invest in pollution control technology, and reduce emissions from the plant.

Ohio Citizen Action

Ruth Breech, 26, an organizer for Ohio Citizen Action, says she wants to make public the "dirty little secrets" about how industrial polluters cause health problems in adjacent "fenceline" communities such as Addyston. A tenacious, high-energy community activist, Breech wants to "tell the untold story" of the people who suffer in silence in these communities where it is not common practice to speak out about the odors coming from the plant. Addyston is a largely white, working-class company town where 97 percent of the tax revenues come from the Lanxess plant, she explains, and most residents have family members or friends who work at the plant. Speaking out against Lanxess is seen as threatening to local jobs: "It is a culture where it is not accepted to rock the boat," Breech observes.

Ruth Breech of Ohio Citizen Action
Photo: Ohio Citizen Action

Ohio Citizen Action, an environmental watchdog organization with 100,000 dues-paying members, targeted Addyston and the Lanxess plant for a citizen anti-pollution and good neighbor campaign because there was an unusually high incidence of asthma and cancer in the community right across the street from a plastics plant that was emitting large quantities of cancer-causing chemicals, Breech explains. Lanxess was also the source of more accidental releases than other companies its size and was one of the top five plants in the county in terms of the toxicity of the chemicals it used and the proximity of the residents to the plant, she says. "I wanted to see the community get its act together and demand that the company not dump a large volume of chemicals only to tell residents five days later that they had been gassed," Breech continues.

By chance, Breech knew the Bowmans since she was a girl growing up in Cincinnati where her father was the place kicker for the Cincinnati Bengals. In September, 2004, Breech began to visit Addyston two to three times a week with a cadre of canvassers ringing doorbells and asking residents what it was like living in such close proximity with the plastics plant. The canvassers heard about the persistent odors from the plant, the dust that collected on their cars, and the large number of illnesses in the neighborhood. For most residents it was the first time anyone had asked them about whether or not the odors from the plant were bothering them and it got them talking among themselves. Collecting the stories permitted Breech to "put a human face" on the impact of the plant's pollution on local residents, she observes.

Accidents Ignite Citizen Concern

Three accidental releases from the Lanxess plant in late 2004 and early 2005 spurred Addyston residents to organize a protest against the odors and chemicals coming from the plant. The first of these occurred on October 2-4, 2004, during the town's Octoberfest when residents held an annual barbecue at the school playground across from the plant. The accidental release was composed of 1,200 pounds of acrylonitrile, a substance classified by the U.S. Environmental Protection Agency as a "probable" cancer causing agent. Laboratory experiments show that rats exposed to the chemical have an increased incidence of tumors. Short-term effects include headaches, nausea, nervous irritability, and kidney irritation. Poisoning that occurs through longer term exposure causes "limb weakness, labored and irregular breathing, dizziness, impaired judgment, cyanosis, nausea, collapse and convulsions." [3]

School Playground Across from the Lanxess Plant
Photo: Steve Lerner

In addition to the release of acrylonitrile, 34 pounds of butadiene and 387 pounds of styrene were also released.[4] Company officials explain that it escaped from tiny cracks in a duct that normally conducts the gas to an incinerator within the plant. Lanxess officials reported the release to the Hamilton County Department of Environmental Services, as required by law; they did not, however, tell residents about the release. It wasn't until late November that Breech found a reference to the accident in public records and alerted town officials. A previous leak of 371 pounds of acrylonitrile over a five-minute period in June, 1999 sickened two employees and resulted in a civil county fine of $37,500.[5]

Jean Owens, an Addyston resident who lives across Route 50 from the plant on Sekitan Street describes acrylonitrile as having a sweet smell. **"It just turns me inside out," she told a reporter. "It's like I can't breathe and I can't move. I do move but I'm just moving like someone who has something really wrong, like cerebral palsy, or something like that...It's just a horrible feeling."** [6]

Ken Perica, the plant director of health and safety assured local citizens that their safety was not endangered by the release. He said that the chemical release, which occurred over a 49-hour period, would have been very dilute by the time it escaped from the plant. He also noted that 10 employees working near the leak showed no ill effects. But Perica's assurances were overshadowed by a second accidental release that occurred on December 15, 2004, when Addyston residents were told that they had been exposed to 700 pounds of acrylonitrile, the "probable" cancer causing agent, as a result of a worker error. Once again, the plant manager at the time, Bill Ward, said that air samples showed no "problem with the gas leaving our plant." However, Peter Sturtevant, an enforcement officer with the county, suggested that the gas might have carried over the company fenceline without tripping the air monitoring sensors. This time Lanxess officials promptly notified the town mayor and other public officials of the release.[7]

A third release two months later on February 23, 2005, received major coverage in the local press and suggested a problematic pattern of releases from the plant. This time the unintentional release was comprised of 750 pounds of butadiene. The company is required to report releases of 10 or more pounds of the substance which is known as an extremely toxic, cancer-causing gas. "Obviously, that's not acceptable," observed Jay Richey, Lanxess vice president and general manager for North America. Richey promised that policies and practices at the plant would be reviewed promptly. Company officials noted that none of their workers had been made ill by the release and suggested that the wind was blowing away from Addyston at the time of the release.[8] "These unintended releases did not expose our employees or anyone in the community to harmful levels of chemicals," he asserted.[9] An Ohio Department of Health study, which used computer modeling and company data, agreed that the three releases did not pose a significant health risk to nearby neighbors. Only the December 15th release "rose to the level of potentially causing headaches, sore throat, or watery eyes," the report suggested.[10]

However, Ruth Breech, at Ohio Citizen Action, argued that the study was suspect because it relied on company data. "These accidents are so consistent that everyone needs to be more proactive" to prevent future releases, she commented.[11] "The Lanxess Plastics Plant in Addyston has chronic, serious problems, including 107 accidents in 2004," Breech wrote in a guest column for a local newspaper.[12] Breech views the series of accidents at Lanxess as dangerous to the local residents. "I definitely believe there is wrongdoing that is going on here, and it needs to be changed," she told a TV reporter.[13] "If the company can't operate responsibly then they should not be permitted to operate at all," she asserts. But Breech is not trying to close the plant. "We want them to stay here. We don't want them to shut down. That is not our intention. We are here to clean them up. We want them to be good neighbors for a very long time," she says.[14]

Mike Kramer, environmental enforcement supervisor at the Hamilton County Department of Environmental Services also sees the series of accidents at Lanxess as constituting a problem: "I think there is a legitimate concern for air quality," he said. "We feel it is a serious enough issue that we're going to make sure the experts…determine if there were any health impacts," he continues. Kramer went on to say that it was unusual to have three accidents in a row such as those experienced at Lanxess and that it worried him.[15] He officially notified the company that it had violated state air pollution laws in three incidents since October.[16]

On March 9, 2005, Lanxess officials reported an additional accidental release of 170 pounds of volatile organic compounds (VOCs); and four days later conceded that 99 more pounds of VOCs were released. Acrylonitrile, butadiene and styrene are all VOCs, notes Breech, and could have been among the chemicals released on either of these two days. Furthermore, VOCs, when mixed with sunlight and heat create ground level smog that can cause lung irritation and they are considered a health hazard.[17]

Media Coverage

One of the first reporters to latch onto the Lanxess pollution story and stick with it was Hagit Limor, 46, a veteran TV journalist who had worked in Tampa, Florida and Asheville, North Carolina prior to moving to Cincinnati in 1994. With 13 years under her belt as a reporter for WCPO's Channel 9 and with five years as the anchor on the I-Team, Limor knew enough about the area's industrial history that she could see that the series of accidents at Lanxess deserved in-depth, serial reports. Limor had known Lanxess in an earlier corporate incarnation as Monsanto, she explains. "Usually no one is around long enough as a reporter that they can see a pattern of violations, Limor observes, but her longevity on the beat allowed her to detect a problematic pattern with the Addyston plant.

Arguing forcefully with her producers that the story deserved major coverage, Limor put together a six and a half minute segment on the releases, which was promoted heavily before it aired, and then followed it up with a dozen shorter pieces as the story unfolded. This kept the Lanxess story front and center in the Cincinnati metropolitan area. Dan Klepal, a reporter for The Cincinnati Enquirer, also assiduously covered the story from the beginning.

"Most Americans expect that the government will protect them from chemical releases [such as those at Lanxess]," Limor said over lunch in Cincinnati. "But what emerged as I did these stories was that **government officials do not lead on these issues but rather need to be led," observes Limor.** "It has been left up to grassroots groups and the media to shine a light on chemical pollution problems. As a result, a lot of corporations that are responsible for a lot of pollution are flying under the radar…and that leaves the population at risk," she says.

At the thirtieth anniversary of Ohio Citizen Action, Richard Challis, 63, presented an award to Limor for the reporting she aired on pollution escaping from the Lanxess plant. Challis, who has lived for the past 25 years with his wife Emily in a house 11 miles from the plant across the river in the town of Erlanger, Kentucky, describes himself as exquisitely allergic to butadiene, one of the chemicals used at Lanxess. When butadiene is emitted by the plant and drifts across the river to his house, Challis experiences acute respiratory distress: **"It is like a seizure. I'm rolling around on the floor gasping for breath unable to breathe,"** he says. His wife has kept a careful log of these allergic episodes and has documented 12,000

incidents over the past quarter century. Over the past year, Emily Challis has compared the log she keeps with those of other residents who keep odor logs in Addyston and found that they track closely.

Richard Challis congratulating Hagit Limor
Photo: Ohio Citizen Action

Challis notes that his allergic attacks don't take place on July 4th, when the plant closes down, providing further evidence to him that Lanxess is the source of his problem. "I don't think I have patriotic allergies," he observes. The worst time for Challis is from midnight to 4:30 in the morning when he believe the plant emits the most butadiene. Unable to sleep during those hours, Challis has taken the second shift at the airport where he works so that he can sleep in the late morning. On a recent vacation to Europe, Challis found that his allergies disappeared: "It was wonderful to sleep through the night," he adds.

Richard Challis & Ruth Breech at OCA 30th Anniversary
Photo: Ohio Citizen Action

"There are 400 people working at Lanxess but it is not worth keeping those jobs if they are poisoning thousands of people," Challis says. "The amount of asthma in kids in Addyston is astronomical and the amount of cancer is horrible," he continues. Challis believes that the Lanxess plant is "poisoning the air." Even the trees are dying, he notes. Since the plastics plant began operations in 1952 the population of Addyston has plummeted from 1,600 to 982 today, he continues. Many people have gotten sick and moved out, he charges.

Challis says he has recently noticed some improvements in the air since they installed new valves at the plant. "But do I think the plant will ever be a safe plant? No I do not…People are dying from this slowly," he concludes.

Elevated Cancer Rates Detected

With nasty odors in the air and heavy media coverage of accidental releases from Lanxess, many Addyston residents began to voice their concerns about the impact on their health from this local source of pollution. Some of them began to speculate that cancer rates in town were elevated. Nancy Scott, a 48-year resident of the town said that her mother, mother-in-law, brother, uncle and grandfather – all Addyston residents – also had cancer. "You go up and down these streets and just about every house has experienced it. I don't want to see anybody lose their job at Lanxess, but I don't think they have been honest with us," she told a reporter.[18] Sue Lloyd, 63, a breast cancer survivor who has lived with her husband in Addyston three blocks from the plant for 40 years had similar concerns. "I've worried about it [cancer] every time since I smelled this odor," she observes. Lloyd includes in the Addyston cancer list herself, her next door neighbor, two people two-doors down from her home, two residents in the house behind her, friends at the plant, and many others.

But these anecdotal reports of a cancer cluster had no scientific standing until a study was done at the request of the Hamilton County General Health District and the Ohio Environmental Protection Agency (OEPA) in 2005. The study indicated that "people who inhaled fumes for decades from the plant have a 50 percent greater risk of developing cancer," than the population at large. Among the chemicals of concern are acrylonitrile and 1, 3 butadiene. Both chemicals are used by Lanxess and are linked to cancer in humans.[19] Lung cancer and leukemia would be the most common forms of cancer cause by the chemicals released from Lanxess, notes Paul Koval, air pollution toxicologist at OEPA.[20]

This information hit close to home, Lloyd says. "When you know so many people who have had it [cancer], it's just distressing," she observes. Lloyd describes the effects of the pollution from Lanxess as follows: **"It would burn my nostrils and my eyes would tear and my throat would get very raw from it. It would just take your breath away," says Sue Lloyd about her reaction to emissions from Lanxess.**[21]

Then on May 25, 2006, over 100 residents, crowded into a VFW hall in Addyston where they were told that cancer rates in their community were 76 percent higher than expected in the general population. This estimate came out of an Ohio Department of Health Study which found that 55 residents in town were diagnosed with cancer from 1996 to 2003 compared with an expected rate of 31.2 cases. Lung cancers were 4 times higher than expected rates, and mouth and colorectal cancers three to four times above normal. Health commissioner Tim Ingram described the Addyston cancer rate as troubling. "This study does not rule in Lanxess [as the cause of the additional cancers], and it does not rule it out," Ingram observed. He called for follow-up studies.[22]

Officials at Lanxess, however, deny that their plant is the cause of elevated levels of cancer in the community. Sandy Marshall, Lanxess plant manager, argues that concentrations of chemicals emitted from Lanxess are hundreds of times lower than those associated with cancer development; and that while butadiene can cause cancer if inhaled continuously over a number of years, the study found none of the cancers associated with the chemical were "statistically significant." [23]

Reacting to community health concerns and community sampling data about the impact of emissions from Lanxess, the Hamilton County Department of Environmental Services installed air monitoring equipment on the roof of the Meredith Hitchens Elementary School located across the street from the plant.[24] The installation of the rooftop monitor came after citizen air monitoring showed serious problems. On May 6, 2005, an air sample collected by local resident Cheryl Siefert, found 87 ppb of butadiene in the air in her backyard. Ruth Breech described the reading as "extremely high" and urged the installation of more sophisticated monitors that continuously take samples. Lanxess officials questioned the accuracy of the sample.[25]

Addyston residents also got help monitoring their air from Hilton Kelley, executive director of the Community In-power Development Association from Port Arthur, Texas. Kelley, who grew up in a public housing complex in Port Arthur immediately adjacent to a huge Motiva refinery, has been organizing residents to force the refinery to install the best available pollution control technologies to reduce pollution on the predominantly low-income, African-American, Westside of the city. As a result of a Sierra Club lawsuit over the violation of air quality standards in the Beaumont/Port Arthur, Texas area, Kelley received $750,000 to buy two CEREX laser air monitoring units that, when hooked up to a computer could provide immediate readouts of toxins in the air in the parts per billion. He has put this equipment to use not just in Port Arthur but also in a number of other fenceline communities such as Addyston.

Hilton Kelley
Photo: Ohio Citizen Action

One sample Kelley captured in Addyston on May 6, 2005, detected 85 ppb of butadiene in the air. Butadiene causes reproductive and developmental disorders as well as producing eye, nose, and throat irritation. In high doses it can affect the central nervous system; and it also has been shown to cause cancer in laboratory animals. Mike Kramer, permits and enforcement supervisor for the Hamilton County Department of Environmental Services, described that sample as well above the level that causes physical irritation. At 1,000 ppb the chemical can cause nervous system damage and unconsciousness.[26] Kramer faults inefficient flaring as possibly the source of a considerable amount of pollution that escapes the Lanxess plant. Flaring is a process by which chemicals are released up the stack and then ignited, he explains. This process is supposed to be 99 percent effective but because the wind blows the gasses

around when they come out of the chimney it can be as little as 20 percent effective. Kramer notes that monitors find spikes in the amount of pollutants detected after a dump and flare cycle.

Some residents near the plant are so concerned that they have taken on the job of doing their own air monitoring with air sampling "buckets" made from 5 gallon plastic buckets, plastic liners, and sealed lids with a small air pump to create a vacuum. These citizen air sampling devices cost about $150 to produce, notes Denny Larson, director of Global Community Monitor, who introduced their use to the region. The buckets are in use in 30 communities around the country and a dozen other locations around the world, Larson explains. They have been useful in proving that air is polluted in fenceline communities adjacent to heavily-polluting industries.[27] Ohio Citizen Action landed a $7,500 grant to ensure that air samples taken by residents could be processed by an independent California laboratory.

Lynn Bowman & Betsy Eckert of the Westside Bucket Brigade
Photo: Ohio Citizen Action

School Closed

On December 6, 2005, Three Rivers School District officials closed the Meredith Hitchens elementary school attended by 370 preschool to first grade students. Their decision was made after hearing the results of the Ohio Environmental Protection Agency's (OEPA) seven month monitoring of air quality in Addyston, across the street from the Lanxess plastics plant. **"These air pollution levels of these two compounds [acrylonitrile and butadiene] on the school were higher than we consider acceptable for public health," Ohio EPA toxicologist Paul Koval told Channel 9 News.**[28] Koval went on to say that the concentrations of chemicals detected on the roof of the school posed a higher than normal risk of cancer for one out of every 200 residents of Addyston over a period of 30 to 70 years. This rate is a far higher level of risk than the one in 10,000 level that the agency deems acceptable. OEPA also ordered Lanxess to reduce emissions of acrylonitrile and butadiene and carry out a planned $2.5 million environmental improvements scheme. "All along we have said whatever recommendations were made by the EPA, we would follow them," observed Rhonda Bohannon, superintendent of the Three Rivers School District. "Today they said they were concerned. We will definitely get our kids out of there," she said.[29]

Meredith Hitchins School closed due to high levels of toxins
Photo: Steve Lerner

For Jennifer Janzen, a mother who pulled her children out of school because they complained of headaches, this was a moment of vindication. Janzen had tried to approach school officials about health concerns related to emissions from Lanxess but had been rebuffed. When she took her children out of school they were listed as absentees and some neighbors thought that she was just trying to stir up trouble, Ruth Breech recalls. But with the school being closed Janzen suddenly appeared more prescient than hypochondriacal.

The question of whether or not to close the school split residents in the communities surrounding the Lanxess plant. "I'm elated," said Sue Wullenweber, who lives near the plant and has a son at the school. "We need to think about the safety of our children…I guess they have gotten the proof that our children aren't safe…(that) there's a true, real concern here, and we aren't crazy," she added.[30] "They should keep Hitchens closed," agreed Charity Hollin, whose six

Basketball court at the Meredith Hitchins School across from the Lanxess Plant
Photo: Steve Lerner

year-old daughter Madison complained of headaches and stomach pains after beginning kindergarten classes at the school, her mother reports.[31]

But many Addyston residents were against the decision arguing that it didn't make sense to close the school but leave children and pregnant mothers living in the town across from the plant. Since the school closed the playground next to it remains open and kids continue to play in it. "What sense does that make?" asks Lynn Bowman. Other residents are glad the school is closed arguing that many of the standards for chemical exposure are for full-grown adults and that children with lower body weights and less well developed immune systems are more susceptible to ill effects from chemical exposures. Complicating the school closure debate is the economic divide between modest-income residents of Addyston and their wealthier neighbors in the communities uphill, some of whom live in large, expensive homes overlooking the river. Some residents of Addyston suspect that the wealthier folks living in surrounding neighborhoods were using pollution problems from the plant as an excuse to ensure that their children would no longer be sent to the low-income school in Addyston.

Industry Perspective

On the other side of the fenceline, people who work at Lanxess argue that the plant does not constitute a threat to the health of its neighbors or workers and that they are making significant progress in reducing odors that come from the plant and accidental releases of chemicals.

Those who work at Lanxess see the plant as an integral part of the community. The plant was founded in 1891 as a factory town to supply workers for industrialist Matthew Addy's pipe foundry. It subsequently became a plastics plant and was purchased by Monsanto in 1951 and subsequently by Bayer in 1996. It currently makes plastic pellets which are sold to companies that melt and mold them into dashboards, telephone headsets, blenders and refrigerator liners. The company has 410 employees and a $32 million payroll. In 2004 Bayer spun off Lanxess as a subsidiary.

Tim Bentner, 43, a big-shouldered man wearing a yellow hard-hat has worked at Lanxess for 20 years and his father and brother have worked there longer. He is convinced the plant is not causing illness in the community. Bentner grew up in Addyston, attended school there, and now lives in the nearby neighborhood of North Bend where he can see the plant from his second story window. After working at the plant all these years and living next to it he argues that **if anyone were made sick by the chemicals it should have been him.**

"If anything happens at the plant we are seen as guilty before being proved innocent," he complains. The media has not done a good job of reporting the story about the plant, he continues. Reporters mention the high cancer rate but they fail to point out that the cancers that are the highest are not ones associated with exposure to the chemicals used at the plant. They also don't report that cigarette smoking is three times the average in town. Bentner believes the operation of the plant is safe enough that he continues to work there and would urge his kids to work there when they come of age. It is only a very small minority of people in the surrounding communities who are concerned about health effects from the plant, he argues.

Yes, there have been three accidents that community members have every right to be angry about, he acknowledges. But the vast majority of 102 malfunctions reported last year are minor technical difficulties that the company is required by law to report but constitute no threat to the public. Ohio Citizen Action has misrepresented the facts, used scare tactics, and created am unwarranted sense of panic in town, he adds. OCA's campaign has been successful at challenging plant managers to do a better job and it has hastened the purchase and installation of pollution control technologies, Bentner concedes, and that was a good thing. "But they have left the community with bitter resentment about the plant and people no longer trust the facility" and that is unwarranted, he asserts.

Duane Day, the Lanxess manager whose job it is to track the company's environmental compliance with state and federal regulations also has problems with Ohio Citizen Action's campaign to clean up the plant. "The campaign took a negative approach and they were not clear what they wanted," he observes. First they focused on odor problems, then dust, then water contamination, then they were worried about

upsets [accidents], and then they wanted a cancer study. The campaign never seemed to have clear priorities and whenever the company would begin to respond they would shift to another issue, he adds.

One of the biggest issues for residents was the odors coming from the plant. In response, Lanxess invested $300,000 to improve its sewer treatment plant and reduced the odors by 90 percent, Day points out. As for the three accidental releases that received so much media attention, Day says that while they were not a cause of health problems in the community it was not acceptable for the company to argue that these malfunctions were just a cost of doing business. "We recognized that there was room for improvement," Day observes. As a result the company committed $1.5 million for new equipment to improve the efficiency of flaring and improve the thermal oxidizer unit. The company had already spent $300,000 to replace some giant valves, he explains.

The company is also reaching out to the community and going door to door talking with residents. "A high percentage of people are OK with us. Only a few had negative comments," Days reports. They also have improved their complaint process so that when residents call to complain about an odor, Lanxess sends someone out to talk to the resident and attempt to capture information immediately in order to investigate.

Kay Rowland, Lanxess Human Resources Coordinator
Photo: Steve Lerner

"I struggle with the accusations that Lanxess is making people sick," says Kay Rowland, 53, Lanxess Human Resource Coordinator, who started work at the plant in 1980 at the age of 26 and lives a seven minute, 2.5 mile drive away from work in Miami Township. "I'm here at ground zero and **I have always felt safe working here," continues Rowland** who observes that many Lanxess employees have parents, grandparents, aunts and uncles who have worked at the plant. Rowland is also not convinced that many of the cancers in Addyston should be attributed to chemical releases from the plant. As an example she cites the case of her father-in-law who died of cancer in 2002 and lived across the street from the plant. "He will be counted as one of the 52 cancer cases but he both drank and smoked for years prior to his death, she points out. "I don't agree that it is all about Lanxess," she says. There may be other factors as well that explain the increased cancer rates, Rowland points out. A lot of people who live in town are in older houses where radon may be a problem, she observes. Then there are multiple other industrial operations such as Kaiser Chemicals and Cinergy that are putting out pollutants.

Rowland thinks that the complaints about the plant have been "blown out of proportion." Sure, sometimes the smell from the plant is annoying: "I don't like the sour egg smell but we are getting rid of that." She is particularly incensed about the Ohio Citizen Action campaign to change the management of the plant that successfully mounted a petition drive to force into early retirement her former boss, plant manager Bill Ward. "He was a decent man and did what he could for the community," Rowland recalls tearfully. His retirement party was like the receiving line at a funeral, she recalls.

The new plant manager, Sandy Marshall arrived in July, 2005, and immediately tried to set a new tone with residents. His message to residents was that the company was going to make significant investments in equipment that would cause the plant to operate more efficiently and with fewer accidental releases. Having the plant be in compliance with regulatory standards was important, Marshall observed, but it was not enough. "**We want to go beyond compliance and meet community expectations** for the way we operate," Marshall says. After all, it is really community expectations that drive whether or not you have a right to operate a facility, he notes.

Asked about recent complaints about foul odors coming from the plant that are causing residents headaches, coughs, and tearing eyes, Marshall warns that improving a plant is a long-term process. "Are we at the holy grail yet? No," he concedes. But the trends are good. Releases of butadiene are down from 5-10 ppb to 1 to 2 ppb; and while reductions in releases of acrylonitrile are not as impressive company managers are starting to focus on them more.

As for the possibility that releases from the plant cause cancer or other health problems in the community, Marshall is skeptical. The plant is meeting occupational standards and has a healthy workforce despite the fact that exposure to chemicals in the plant are likely to be 1,000 times higher than in the surrounding residential community, he points out. And most of the cancers reported in the community are not ones associated with the chemicals used at the plant, he adds. Marshall is also "not convinced" by the Ohio EPA's risk assessment projections that point to a 50 times higher probability of contracting cancer among residents with long-term exposure to chemicals coming from the plant. And he was "disappointed" by the decision to close the school across from the plant.

The company will also challenge in court a state regulatory standard that was recently imposed which is requiring the plant to lower the level of butadiene in the air outside its fenceline to less than 1 ppb, a level lower than the "background" level that exists around the metro area, Marshall continues. "They are doing administrative law setting," he asserts, without going through the normal steps involved in setting regulations.

On June 14, 2006, The U.S. EPA issued an 8-page Notice of Violation against Lanxess citing air pollution problems, leaks in the chemical piping system, and asking questions about wastewater discharge. Plant Manager Marshall took exception to some of the conclusions drawn by the notice of violation but said plant workers had already fixed or were working on four of the six issues raised.[32]

Lanxess Under Close Watch

The new Lanxess management team is beginning to make positive changes and they have committed money to upgrading pollution controls but whether or not they will carry through on all their commitments remains to be seen, says Sandy Buchanan, executive director of Ohio Citizen Action, the state's largest environmental organization. "We are going to continue to track this very closely," she continues. Buchanan has been following the environmental record of the plant ever since it was operated by Monsanto when the plant already had a history of lax environmental management and accidental releases. "Everyone knew the plant was a problem even back then," she recalls.

"Our most significant contribution is that we took the problem that was festering in Addyston for 50 years and we forced people to do something about it," she continues. As a result of Ohio Citizen Action's high-profile, Good Neighbor Campaign that highlighted toxic releases from the plant, regulatory officials suddenly started discovering problems with the plant, with the releases, with the cancer rates, and with the school. "Ruth Breech did an amazing job of helping neighbors organize and meet every week," Buchanan continues. She went into a highly charged environment in a small company town where the mayor was not happy with an outside group raising issues about air quality and she did not back down, Buchanan says with undisguised pride. Through canvassing and walking-and-talking tours through Addyston, Breech continued to find new people willing to speak out and keep pressure on Lanxess to clean up its act. "As a result I think we had a significant impact on the way the company operates," Buchanan concludes.

Whether or not Lanxess officials will be able to significantly reduce every-day and accidental releases from the plant remains an open question. What seems sure, however, is that the media and environmental groups will continue to follow this story closely and that the residents of Addyston, now informed about the dangers of some of the chemicals being handled next door, will continue to watch their neighborhood industry for releases and demand improvements.

Steve Lerner is Research Director at Commonweal, a non-profit located in northern California that focuses on environmental health issues.

This story and others like it can be found on the Collaborative on Health and the Environment website at: www.HealthandEnvironment.org.

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UNITED STATES, et al.

v.

INEOS ABS (USA) CORPORATION, et al.

C.A. No. 1:09-CV-545

EXHIBITS TO MOTION FOR ENTRY OF FIRST AMENDMENT

EXHIBIT 3

COMMENT OF MR. CHRIS THEOBALD

Lang, Annette (ENRD)

From: Davis, Buffy (ENRD)
Sent: Monday, February 09, 2015 9:41 AM
To: Lang, Annette (ENRD)
Subject: PUBLIC COMMENT - CHRIS THEOBALD

FYI

From: Theobald, Chris [mailto:Chris.Theobald@FMR.com]
Sent: Monday, February 09, 2015 8:45 AM
To: ENRD, PUBCOMMENT-EES (ENRD)
Subject:

Hello all, I hope all is well. I have been in Addyson , Ohio boating for years in the Catalina Harbour. I know that in times the owner of the marina Steve Todd would tell us that for years he and his family would receive money from INEOS ABS for not dredging his marina. I will always remember them laughing at how they would just get money from INEOS ABS for not dredging their property, due to the fact that it was polluted. I hope that you do the right thing. There are many kids in the neighborhood that play in the marina and that fish and play in the suet. Just do what is right. Thank You Chris Theobald.

UNITED STATES, et al.

v.

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EXHIBITS TO MOTION FOR ENTRY OF FIRST AMENDMENT

EXHIBIT 4

AUGUST 2012
EPA ENFORCEMENT ALERT

United States Environmental Protection Agency
Office of Enforcement and Compliance Assurance (2201A)
EPA 325-F-012-002

Enforcement Alert

Volume 10, Number 5 Office of Civil Enforcement August 2012

EPA Enforcement Targets Flaring Efficiency Violations

Purpose

EPA is devoting significant enforcement resources to correcting regulatory noncompliance at flares. This Alert is intended to inform flare owners and operators of this enforcement initiative and to educate them on proper flare operation. EPA hopes this Alert will spur improvement of flare operating practices, including better control and monitoring of supplemental gas, air, and steam, and thereby reduce harmful emissions to the environment. Better flare operation practices will have the potential to improve public health by: 1) reducing emissions of toxic air pollutants that may pose a health risk; and 2) reducing volatile organic compound emissions which will in turn reduce the formation of ozone which is potentially harmful to vulnerable populations including the young, elderly, and those with respiratory problems. Moreover, improving flare combustion efficiency can result in cost savings due to reduced steam usage.

Introduction

Chemical and petroleum facilities generate waste gases that need to be controlled safely, economically, and in a manner that protects the public health and the environment. The law requires facilities to use good air pollution control practices to minimize the emission of waste gases, see EPA's October 2009 Enforcement Alert, http://www.epa.gov/compliance/resources/newsletters/civil/enfalert/flaring.pdf.

Because, not all waste gases can be prevented or recovered, various control technologies are used to reduce the impact of these waste streams on the environment; one common technology is flaring. A flare is a mechanical device used to combust and thereby destroy volatile organic compounds, toxic compounds, and other pollutants at refineries and other industrial sites.

EPA investigations have found flares that were operated so poorly that there was likely no combustion taking place at all. In these circumstances the flare was merely venting pollution directly to the atmosphere.

Federal requirements for flares are found in the New Source Performance Standards (NSPS) in § 60.18 and National Emission Standards for Hazardous Air Pollutants (NESHAP) in § 63.11. At a minimum, these rules require flares to be:

- Designed and operated with no visible emissions using EPA Method 22 (except for periods not to exceed 5 minutes in 2 hours);
- Operated with a flame present at all times, confirmed by the use of a thermocouple or equivalent device;
- Used only when the net heating value of the gas to be combusted is 300 BTU per standard cubic foot (BTU/scf) or greater (if the flare is steam- or air-assisted), or 200 BTU/scf or greater (if the flare is nonassisted); and
- Designed for and operated with an exit velocity less than 60 feet per second (ft/sec). An exit velocity of greater than 60 ft/sec but less than 400 ft/sec may be used if the net heating value of the gas being combusted is sufficiently high.

Through its inspection and enforcement programs, EPA has identified many instances where flares have been improperly monitored and operated. The consequences are lower combustion efficiency and potentially significant quantities of excess emissions of volatile organic chemicals, sometimes including hazardous air pollutants.

Flare Design Characteristics

Flares are specifically designed to combust gases. Many flares employ steam or air to promote mixing of oxygen within the Vent Gas to ensure combustion occurs without smoke.

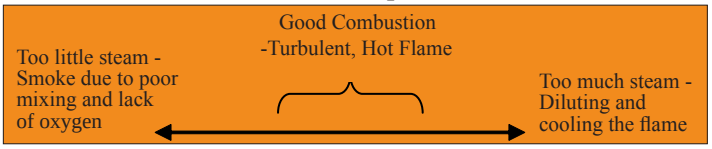
Smoke is an indication that hydrocarbons are not being combusted completely.

There are many parameters that affect the combustion efficiency of a flare. One important parameter is the heating value of the gases that are to be combusted, often measured in BTU/scf. The heating value is a measure of the combustibility of the gas. Generally, it is easier to maintain a stable flame and achieve high efficiency for gas streams with higher heating

values. The NSPS and NESHAP requirements regulate the net heating value and require gases contain at least 300 BTU/scf if they are being combusted in an air or steam assisted flare. If this heating value minimum cannot be met by the Vent Gases alone, then supplemental gas, such as natural gas, must be added.

Federal regulations prohibit extended periods of smoking at flares. Adding the proper amount of steam or air to avoid smoke is beneficial, but adding excessive amounts is detrimental. Excess steam or air mixed with the Vent Gas cools the flame and dilutes the Vent Gas thereby lowering the heating value. Steam addition is usually measured as the ratio of pounds of steam per pounds of Vent Gas (lb/lb). There is no single steam-to-Vent Gas ratio that is appropriate for all flares. The types of compounds being combusted, and to some extent the flare design, determine the proper ratio. There are, however, general guidelines that suggest approriate ratios, with the most important being the manufacturers' recommendations, which tend to be between 0.1 and 1lb steam per lb of Vent Gas.

Vent Gas is the mixture of gases that are to be combusted, usually found just inside the flare. The Vent Gas consists of combustible process gases, supplemental gas, inert compounds, purge/sweep gases, and other material.



In addition to the numeric standards governing flares (*e.g.*, net heating value, exit velocity), there are NSPS and NESHAP general provisions that require process and pollution control equipment be operated using good air pollution control practices to minimize emissions, and in accordance with the equipment's design. Since it would be impossible for EPA to list all "common practice" actions for equipment owners (*e.g.*, keep equipment from freezing, keep electrical equipment dry), these two narrative standards minimally require a flare operator to follow the equipment manufacturers' specifications, and to stay abreast of and apply the current state of scientific knowledge on flare operation and combustion to minimize emissions.

Federal requirements for equipment operators' general duty are found in the NSPS and NESHAP.

- "At all times, including periods of startup, shutdown, and malfunction …the operator shall operate and maintain any affected source, including associated air pollution control equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions." *See, e.g.*, 40 CFR § 63.6(e), 40 CFR § 60.11(d).
- "Operators of control devices that are used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their design. *See, e.g.*, 40 CFR § 63.172(e), 40 CFR § 60.482-10.

A number of studies have been conducted to assess flare efficiencies and to identify the factors that affect flare performance. One simple and critical parameter already mentioned is the steam-to-Vent Gas ratio. Another parameter with an even better correlation to combustion efficiency for steam assisted flares is the heating value of the combustion zone gas. EPA's recent settlements define combustion zone gas as all Vent Gas, pilot gas, and all steam just outside the flare tip, where combustion is supposed to take place. This parameter is not to be confused with the net heating value of Vent Gas found in current regulations which does not include steam or pilot gas and is measured just inside the flare. In the enforcement context, EPA may analyze the heating value of the combustion zone gas to estimate a flare's combustion efficiency. A finding of low combustion efficiency is indicative of a potential failure to comply with the general duty provisions discussed above.

Recent Flare Testing and the Net Heating Value of the Combustion Zone Gas.

- The net heating value in the combustion zone (NHVcz) gas correlates well with combustion efficiency for steam assisted flares. It is a better indicator of efficiency than the heating value of the Vent Gas alone.
- NHVcz is currently not a regulatory requirement, and is different from the current Vent Gas heating value minimum standards of 200 and 300 BTU/scf.
- NHVcz is calculated using the Vent Gas heating value, the flow rates of Vent Gas, steam and the pilot gas (as per recent settlements).
- NHVcz is closely related to another parameter, the Lower Flammability Limit of the Combustion Zone.
- Recent testing provides insight into NHVcz and its relationship to efficiency:
  - o "TCEQ 2010 Flare Study", Texas Commission on Environmental Quality, August 1, 2011. http://www.tceq.texas.gov/assets/public/implementation/air/rules/Flare/2010flarestudy/2010-flare-study-final-report.pdf
  - o "Performance Test of a Steam-Assisted Elevated Flare with Passive FTIR" for Texas City and Detroit, Marathon Petroleum Corporation, September 2009 and July 2010. http://www.epa.gov/compliance/resources/publications/civil/programs/caa/texascity-report.pdf http://www.epa.gov/compliance/resources/publications/civil/programs/caa/detroit-report.pdf
  - o "PFTIR Tests of Steam-Assisted Elevated Flares - Port Arthur", Flint Hills Resources Port Arthur, LLC, June 2011. http://www.epa.gov/compliance/resources/publications/civil/programs/caa/portarthur-report.pdf

Factors Affecting Flare Performance:

1. Flame Quenching in the Combustion Zone

Mixing is important because the Vent Gas and oxygen must be well mixed to complete combustion. Studies indicate that the assist-to-gas (steam-to-Vent Gas or air -to-Vent Gas) ratios are critical to combustion efficiency. Generally speaking, steam-to-Vent Gas ratios ranging between approximately 0.2 and 1.0 will result in the highest efficiency. Supplying a mass of air less than approximately 7 times the stoichiometric mass of air will result in the highest efficiencies.

Problems occur when flame quenching takes place, sometimes termed "oversteaming" or "overaeration," which occurs at high assist-to-gas ratios. The problems occur because:
- Facilities mistakenly believe that excess steam or air will allow good combustion.
- Facilities fail to reduce steam or air when Vent Gas flow transitions from high to low.
- Facilities have minimum steam addition rates to protect the flare tip from overheating. During low waste gas flow, the resulting steam-to-Vent Gas ratio can be very high, causing oversteaming.
- The steam control equipment associated with a steam-assisted flare lacks adequate flow adjustment precision, which results in excess steam flow at low waste gas flow.
- The air blower associated with an air-assisted flare lacks adequate flow adjustment, which results in excess air at low waste gas flow.

These problems lead to significantly lower flare combustion efficiencies.

To correct these potential problems, facilities can use one or a combination of techniques, including:
- Continuously measure the flow rate of the waste gas and continuously measure, and then control, the steam or air being added as assist gas. Follow the manufacturer's recommendations and publicly available documents in setting proper assist gas rates.
- Utilize automatic damper actuators or variable frequency drives on the air supply system.
- Reduce the "minimum" or "cooling" steam rates as low as possible while still being protective of the physical integrity of the flare.

Factors Affecting Flare Performance:

2. Low Heat Value in Vent Gas

Vent Gas Heating Value is important because sufficient combustible material must be present to maintain flame stability and achieve high efficiency.

Problems occur because facilities use flares to control waste gases that have low heating value without adding supplemental fuel to raise the Vent Gas heating value to the regulatory minimum of 200 BTU/scf or 300 BTU/scf. *See, e.g.*, 40 CFR 60.18(c)(3)(ii). This issue is not to be confused with NHVcz and flame quenching discussed above. Low heating value in Vent Gas occurs because:
- Facilities use flares to control a variety of streams with varying quality. When only one or a few low-flow sources are venting to the flare, the volumetric flow and combustible material concentrations can be minimal.
- Batch processes are inherently variable and will have periods of very low flow or high inert (*e.g.*, nitrogen) concentrations. Inert gas lowers the heating value of the gas mixture.
- Supplemental fuel requirements can be costly; facilities may choose not to incur that cost and will combust the low heating value stream alone.
- Facilities conduct compliance tests under themaximum conditions where problems with low heating values are unlikely. In practice, flares are not always operated at these "ideal" rates.

These problems lead to lower flare combustion efficiencies.

To correct these potential problems, facilities can:
- Ensure that the Vent Gas meets the current regulatory heating value limits of 300 BTU/scf for assisted flares, and 200 BTU/scf for unassisted flares, at all times. This will require evaluating the heating value of Vent Gas over the full range of operating scenarios.
- Determine the heating value of the Vent Gas as a whole, not only the hydrocarbons in the Vent Gas, just before it leaves the flare tip. The heating value evaluation includes nitrogen and any other compounds that make up the gas mixture that is present just inside the flare tip.
- Monitor the Vent Gas flow and automatically supply supplemental fuel if the Vent Gas does not have sufficient heating value.
- Evaluate other control options and limit flare use to true emergency situations.

Well Operating Flare – High Combustion Efficiency

Marathon, BP North America, and Ongoing Enforcement

Two recent judicial settlements, one with the Marathon Petroleum Company and another with BP North America, include injunctive relief designed to address potential oversteaming issues and limit the level of future flaring. See, http://www.epa.gov/compliance/resources/cases/civil/caa/marathonrefining.html and http://www.epa.gov/compliance/resources/cases/civil/caa/bp-whiting.html. These settlements highlight, in addition to liability related to the general duty provisions discussed above, potential New Source Review (NSR) liability at flares. This liability stems from periods of low combustion efficiency that result in higher pollutant emissions. A source's failure to recognize and account for these emissions can result in NSR violations. In addition, oil refiners face possible NSPS Subpart J/Ja liability because of the potential of burning non-compliant gas in flares.

Flare compliance is an ongoing priority for EPA generally and under the Air Toxics National Enforcement Initiative specifically. http://www.epa.gov/compliance/data/planning/initiatives/initiatives.html#airtoxic. EPA encourages any company that believes it may have operated flares in a manner that resulted in poor combustion efficiency to expeditiously disclose and correct violations.

If Vent Gas is being sent to a flare but there is no visible flame, or if only a steam plume is visible, the flare may be operating at low combustion efficiency. It is better for the environment for a flare to produce a large orange/yellow flame than no flame at all when Vent Gas is present.

Penalties for Violations

Violating federal requirements for flares can result in a penalty, under the Clean Air Act, of up to $37,500 per violation, per day. To knowingly violate a flare requirement, including knowingly making a false or fraudulent statement or omiting material information required concerning a flare and its operation, can subject a person to criminal prosecution. Convictions can result in fines, imprisonment, or both.

Conclusion

EPA Enforcement is investigating and seeking resolution of low heating value and excess steam or air addition at industrial flares. When flaring is unavoidable, Vent Gas must be monitored and its heating value adjusted as necessary in order to meet the current regulatory standards for the heating value of Vent Gas. Moreover, monitoring the Vent Gas and steam or air flow and applying steam or air and supplemental gas in an amount that results in high combustion efficiency helps assure compliance with the general duty requirements. Finally, flare owners are expected to operate in accordance with the manufacturer's recommendations and publicly available documents, including the long-available literature from EPA, and generally available documents regarding the current state of scientific knowledge on flare operation and combustion.

Poorly Operating/Over Steamed Flare - Low Combustion Efficiency

Disclaimer: This document puts EPA regulatory provisions in context with plain language. Nothing in this Enforcement Alert revises or replaces any regulatory provisions in the Rule, any other part of the Code of Federal Regulations, the Federal Register, or the Clean Air Act. For more information go to: www.epa.gov/compliance.

UNITED STATES, et al.

v.

INEOS ABS (USA) CORPORATION, et al.

C.A. No. 1:09-CV-545

EXHIBITS TO MOTION FOR ENTRY OF FIRST AMENDMENT

EXHIBIT 5

JULY 2010
PASSIVE FTIR TEST RESULTS

PASSIVE FOURIER TRANSFORM INFRARED TECHNOLOGY (FTIR) EVALUATION OF P001 PROCESS CONTROL DEVICE AT THE INEOS ABS (USA) CORPORATION ADDYSTON, OHIO FACILITY

July 2010

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1.0 SUMMARY OF EVALUATION PROGRAM

Pursuant to the Consent Decree (Civil Action No. 1:09-CV-545) between U.S. Environmental Protection Agency (EPA) vs. INEOS ABS (USA) Corporation (INEOS ABS) and LANXESS Corporation, INEOS ABS performed a Passive FTIR evaluation on the P001 Process control device at the INEOS ABS Addyston, Ohio facility. The purpose of the evaluation was to determine the appropriate Net Heating Value of Flare Gas (NHVFG) limit to be used to operate the control device to ensure 99% control efficiency.

The Passive FTIR (PFTIR) evaluation was performed on the P001 process air pollution control device (the Flare). The PFTIR method was used to estimate emissions from the Flare by measuring carbon dioxide (CO_2), carbon monoxide (CO) and total hydrocarbons (THC) in the Flare output stream (the area above the flame of the Flare) at varying operating conditions and NHVFG values. The PFTIR evaluation was a comparative test only as it is still a developing technology for measuring flare emissions.

The EPA has proposed that a NHVFG of 200 British Thermal Units per standard cubic feet (BTU/scf) yields a control efficiency of 99%. This PFTIR evaluation compared environmental performance at different NHVFG values so as to determine the range of NHVFG that provides optimum environmental performance for operation of the Addyston Flare.

INEOS ABS contracted with Industrial Monitor and Control Corporation (IMACC) to perform the PFTIR evaluation of the Flare. The test was performed in a timely manner on November 3 through November 5, 2009. The following personnel from EPA and Hamilton County Department of Environmental Services (HCDES) observed the evaluation:

- Cary Secrest, EPA Headquarters (Washington, D.C.)
- Brian Dickens, EPA Region V (Chicago)
- Mike Kramer, HCDES

The evaluation pursuant to the Consent Decree was only being used to provide information to the EPA Office of Enforcement and Compliance Assurance (OECA), Director of Air Enforcement of the Office of Civil Enforcement (OCE) to aid in his/her decision in the establishment of a newly defined lower NHVFG limit to be used to control the P001 Process Flare. This evaluation was not used as a means to determine compliance with the facility's Title V Permit.

2.0 SOURCE DESCRIPTION

2.1 PROCESS DESCRIPTION

Figure 2-1 illustrates the basic processing steps in the P001 Process. The general steps in the process include:

- Reacting 1.3-butadiene with other ingredients in kettles to produce a rubber latex;
- Cooling the intermediate latex; and
- Holding the intermediate latex in preparation for further processing.

The P001 process is a batch process. Process emissions from the P001 process are routed to the Flare or the boilers for destruction. Process emissions are generated as the materials react, while materials are cooling in process tanks, or when materials are breathing while in storage tanks. Process emissions sent to the Flare are routed through the seal tank on the way to the Flare (see Figure 2-2). Wastewaters from the process are routed to the chemical sewer for further treatment at the facility's wastewater treatment plant.

2.2 CONTROL EQUIPMENT DESCRIPTION

The Flare is the control device that was evaluated during this test. The Flare's steam-assisted tip was manufactured by the John Zink Company, LLC (Zink) (Model # EEF QS-16) and is equipped with a Zink airrestor purge reduction device (Model # EEF-AR-16). Figure 2-2 shows the P001 process vent overview and Figure 2-3 shows the Flare layout.

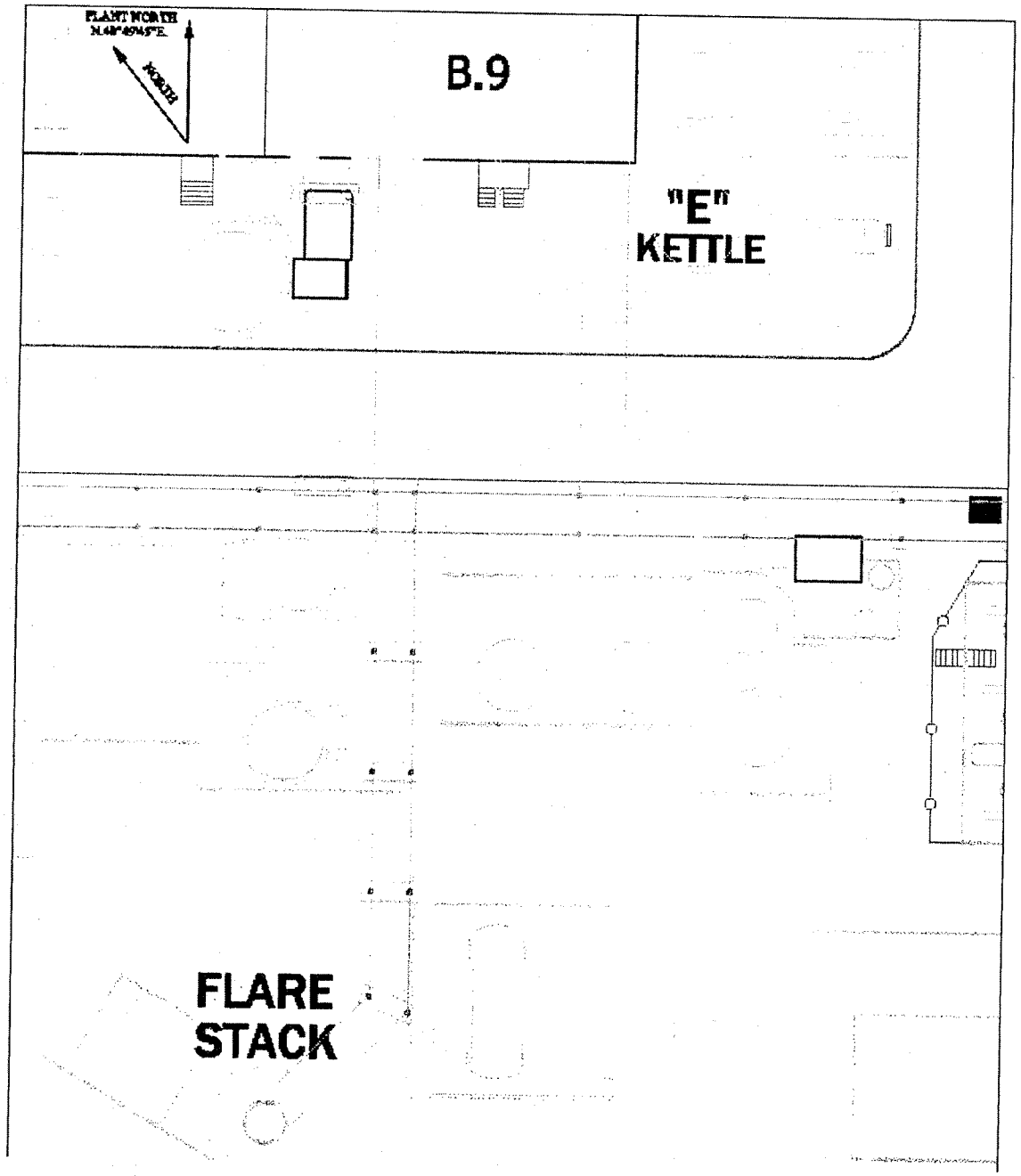
Several monitoring instruments are used to calculate parameters that have been identified as influencing flare efficiency. The amount of steam flow to the Flare tip and the amount of natural gas added to the Vent Gas are direct measurements from flow meters in the field. A GE Sensing DigitalFlow Panametrics Ultrasonic Flowmeter (Panametrics Model # GF868) is located in the Flare system to measure velocity and molecular weight of the stream from the seal tank to the Flare. These measured values are used to calculate the amount of 1,3-butadiene in the stream, total Vent Gas flow rate and subsequent heat value of the Vent Gas going to the Flare. In addition, these values can be used to calculate the steam-to-Vent Gas ratio and the lower NHVFG.

2.3 SAMPLING LOCATION

The PFTIR evaluation was performed on the P001 Process Flare. The location of the FTIR equipment was on an elevated platform 165 feet to the east of the Flare (labeled "E" KETTLE on Figure 2-4). This location gave a direct line of sight to the Flare tip and plume and helped to minimize interferences from surrounding buildings and process equipment. However, one limitation this created was experienced whenever the wind direction was blowing the plume towards or away from the FTIR camera. This made it more difficult to keep the camera focused on the best part of the plume to give a good indication of composition.

The PFTIR measurements were intended to be taken in the centerline of the plume with the plume filling the entire field of view of the FTIR equipment. A thermal imaging camera was used to aid the technicians in making constant manual adjustments of the position of the FTIR camera by attempting to locate the hottest area above the flame in the Flare plume that would allow for a full field of vision for the FTIR equipment. The zone monitored was intended to be above the combustion zone so the majority of combustion was complete, yet low enough so the temperature was above 200°C to allow detection (within two meters of the flame).

Figure 2-4 Sampling Location



3.0 EVALUATION PROGRAM SUMMARY AND RESULTS

3.1 OBJECTIVES AND TEST MATRIX

The purpose of the PFTIR evaluation was to determine the appropriate lower NHVFG limit to be used to operate the P001 Process Flare. The PFTIR method was used to estimate the emissions from the Flare by measuring CO_2, CO and THC in the Flare output stream (the area above the flame of the Flare) at varying operating conditions and NHVFG values.

During the evaluation, operating scenarios of the Flare were varied in order to determine which lower NHVFG limit is the most appropriate, i.e. most efficient. Operating scenarios involved varying the flow rates and composition of the steam and the Vent Gas stream. The purpose of this evaluation program was to run scenarios to bracket conditions and to compare emissions at different scenarios. The ultimate goal was to compare the emissions at different scenarios and recommend the future lower limit of NHVFG. It is proposed that any scenarios with lower emissions than those seen at the 200 BTU/scf scenarios would be considered to be representative of control efficiency higher than 99% as the EPA has stated that a 200 BTU/scf NHVFG would achieve a 99% efficiency.

Table 3-1 presents the sampling and analytical evaluation matrix that was proposed to be used to help establish the appropriate lower NHVFG limit. The runs were divided into four different flow rates of 1,3-butadiene. Different NHVFG were proposed within each of these flow rates.

3.2 FIELD TEST CHANGES AND PROBLEMS

At the beginning of the evaluation, it became apparent that achieving and keeping steady flows to the Flare would be challenging. Due to these complications, several runs were modified and not performed in the order that was proposed. These runs were modified after consulting and receiving the approval of the EPA and HCDES who were observing the evaluation on site. The modified sampling and analytical evaluation matrix that was followed during the field test is shown in Table 3-2.

In particular, during some test runs, 1,3-butadiene flows were modified (lower or higher than proposed). As a consequence, the exit velocities were also either lower or higher than proposed. However, the target NHVFG for the test runs was not impacted as this was the value that was the controlling parameter to start each test run. The flows of 1,3-butadiene, natural gas, and steam were modified for each test run to achieve the target NHVFG. Once the target NHVFG was achieved the test was begun. In addition, two test runs (Runs 1B and 12) were shortened to less than twenty minutes of sampling time due to significant changes in 1,3-butadiene flow rates. Runs 6, 7, 9 and 17A were shortened under agreement with EPA and HCDES as good data was determined to have been collected in less than 20 minutes.

IMACC performed daily calibration checks using the black body source. IMACC is working on technology to do calibration tests for the primary gas of concern (1,3-butadiene in the case of these tests) by using a flow tube with that gas in it. This approach was not used for these tests as the technology was not available for 1,3-butadiene at the time of the evaluation.

Initial instrument set-up was performed on November 3, 2010 and shots of the sky were made during calibration. Problems with the sensor becoming saturated were experienced when the sensor was exposed to too much sunlight and a different sensor tube had to be installed.

On the night of November 3, 2010, the instrument got too cold and difficulties were experienced with sluggish movement of sensor elements which influenced analyzer capability the next day. These problems were minimized by providing a heat source for the sensor housing for subsequent runs.

3.3 SUMMARY OF RESULTS

Upon review of the PFTIR test data, it was discovered that there was a problem with some of the data generated by the Panametrics monitoring system. After a great deal of investigation and extensive discussions with the manufacturer of the Panametrics monitoring system, it was discovered that a fixed (80%) nitrogen concentration value differed greatly from actual concentrations and hence impacted the resulting molecular weight calculation performed by the Panametrics.

Upon this discovery, INEOS ABS acted promptly and diligently to determine the nature of the problem and to seek a remedy. In this regard, it was discovered that the manufacturer of the monitoring system (GE Sensing) had developed an algorithm to correct this problem, but the manufacturer initially refused to provide this proprietary solution. Finally, in exchange for a fee and a confidentiality agreement, INEOS ABS obtained the algorithm. The algorithm is extremely complex and has taken a significant period of time to make the necessary corrections to the data. INEOS ABS is in the process of converting the test data in order to evaluate the appropriate NHVFG limit to be used to operate the P001 Process Flare.

Please see the timeline of events below. As such, this report will be amended to include the results of the evaluation by August 6, 2010.

Date	Event
3/22/10	Conference call between EPA, HCDES, and INEOS ABS regarding correct method to calculate 1,3-butadiene flow.
4/15/10	Conference call between EPA, HCDES, and INEOS ABS continuing discussion on correct method to calculate 1,3-butadiene flow and discussion regarding the Panametrics with regards to nitrogen concentrations and molecular weight.
Week of 04/12/10	Began discussion with GE Sensing to obtain algorithm to correct molecular weight.
4/21/10	Conference call between EPA, HCDES, and INEOS ABS continuing discussion on correct method to calculate 1,3-butadiene flow and the Panametrics with regards to nitrogen concentrations and molecular weight.
4/22/10	GE Sensing agreed that it may be possible to supply an algorithm to correct molecular weight.
5/3/10	Conference call between EPA, HCDES, and INEOS ABS continuing discussion on

correct method to calculate 1.3-butadiene flow and the Panametrics with regards to nitrogen concentrations and molecular weight. Agreed that % mass verses % mol would be used to calculate 1.3-butadiene flow.

5/6/10 GE Sensing agreed to supply INEOS ABS with the algorithm for a fee and a Confidentiality agreement. GE Sensing to supply proposal to INEOS ABS.

5/10/10 Conference call between EPA, HCDES, and INEOS ABS continuing discussion on the Panametrics with regards to nitrogen concentrations and molecular weight.

5/13/10 INEOS ABS received proposal from GE Sensing.

5/14/10 INEOS ABS submitted Purchase Order to GE Sensing.

5/25/10 INEOS ABS received algorithm from GE Sensing.

Table 3-3 Data Summary Table
INEOS ABS – Addyston, Ohio

Test Run	Proposed Exit Velocity (ft/min)	Actual Exit Velocity During Test Run (ft/min)	Proposed Butadiene Flow (lb/hr)	Actual Butadiene Flow During Test Run (lb/hr)	Proposed NHVFG (BTU/scf)	Actual NHVFG (BTU/scf)	PFTIR Estimated Efficiency (%)
1	110	*TO*	300	*TO*	120	*TO*	*TO*
1A	NA	*BE*	NA	*BE*	NA	*BE*	*BE*
1B	NA	*PROVIDED*	NA	*PROVIDED*	NA	*PROVIDED*	*PROVIDED*
2	120	*AFTER*	300	*AFTER*	200	*AFTER*	*AFTER*
3	110	*THE*	300	*THE*	150	*THE*	*THE*
4	160	*TEST*	300	*TEST*	180	*TEST*	*TEST*
5	110	*DATA*	300	*DATA*	230	*DATA*	*DATA*
6	180	*IS*	600	*IS*	150	*IS*	*IS*
7	270	*CONVERTED*	600	*CONVERTED*	210	*CONVERTED*	*CONVERTED*
8	250		600		190		
9	250		600		230		
10	75		50		120		
11	90		50		200		
12	40		50		200		
13	90		50		140		
14	80		50		160		
15	80		50		180		
16	90		50		220		
17	50		10		140		
17A	NA		NA		NA		
18	60		10		200		

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 EVALUATION METHODS

The PFTIR evaluation was performed on the P001 Process Flare at varying operating scenarios as shown in Table 3-2. Control instrumentation was used to measure and vary the operating conditions and included:

- Flow meters and valves for natural gas, steam, and nitrogen streams;
- Process valves from C kettle for the 1,3-butadiene stream; and
- Panametrics for the stream from the seal tank.

A charge of hot water followed by liquid 1,3-butadiene was sent to a rubber kettle at the beginning of the evaluation. The jacket on the kettle heated the contents and caused the 1,3-butadiene to go into the vapor phase and flow to the Flare system. The vapors were sent to the Flare through the reflux vent valves for the low flows (~ 10 and 50 lbs/hr 1,3-butadiene flow) and through the four-inch vent header for the large flows (~300 and 600 lbs/hr 1,3-butadiene flow). The composition was measured by the Panametrics and flows were adjusted to get the desired 1,3-butadiene flow. Once the 1,3-butadiene flow was established, the nitrogen, natural gas, and steam flows were adjusted as necessary to get the desired NHVFG level.

During the evaluation, the INEOS ABS video camera recorded the plume in order to record any visible emissions (soot generation) from the plume during each scenario. Visible emissions can negatively impact the quality of data generated by the FTIR equipment and would prevent the ability to complete evaluations at specific operating scenarios. There were no test runs where visible emissions negatively impacted the results.

In addition, the INEOS ABS weather station was used to collect data (ambient temperature, relative humidity, ambient pressure, and wind speed) during the duration of each run for all the operating scenarios. This data was used to determine if a steam contribution factor should be applied to a particular test run.

The NHVFG value is the measure of enthalpy (ΔH_f^{298}) of the components that comprise the Flare Gas. Flare Gas is the sum of the entire stream measured by the Panametrics plus the supplemental natural gas sent to the Flare stack, plus the natural gas sent to the pilot burners, plus the steam determined to participate in the reaction zone. The density of the Flare Gas is determined by dividing the component molecular weight(s) by the molar volume at STP conditions (14.696 psia and 60°F, resulting in a STP molar volume of 379.48 ft^3/lb-mol. References for these STP conditions include Perry's Handbook 8th Edition Table 1-4 Conversion Factors, as well as Crane's Technical Paper No. 410 on Flow of Fluids).

The molecular weight of each component is as follows:

The stream exiting the seal tank = Determined by the Panametrics
Natural gas (based upon compositions from Duke Energy) = 16.40
Steam = 18.015

The enthalpy of each component (using a reference point of 298.15 K for ΔH_f) is as follows:

1,3-butadiene (Perry's Handbook 8th Edition) = 19,160 BTU/lb
Natural Gas (NASA Polynomials; Duke Energy gas composition) = 915 BTU/scf
Steam (NASA Polynomials) = 131 BTU/lb (steam supplied to the tips at 458.7 K)

The NHVFG value was determined using the following equation and agreed upon by the EPA in August 2007:

(1,3-butadiene flow [lbs/hr] * 19,160 BTU/lb + natural gas (supplemental + pilots) flow [scfh] * 915 BTU/scf + steam flow included [lbs/hr] * 131 BTU/lb) / (lb-moles/hr of total Flare Gas * 379.48 scf/lb-mole)

When exit velocities from the Flare are less than 75 feet per minute (ft/min), a steam contribution factor was applied when calculating the NHVFG and steam-to-Vent Gas ratio. It has been agreed to by the EPA and INEOS ABS during Consent Decree negotiations that at certain velocities only a portion of the steam participates in combustion with the Flare Gas just after the exit of the Flare tip. The EPA concluded that the steam contribution factor only includes 37.5% of the steam when exit velocities are below 75 ft/min. However, INEOS ABS believes that the appropriate exit velocity to apply a steam contribution factor is 100 ft/min. This exit velocity threshold is under appeal at the time of the writing of this report. The adjusted exit velocities using the steam contribution factor at exit velocities below 75 ft/min are shown in Tables 3-1 and 3-2.

The PFTIR evaluation measured the concentrations of CO_2, CO, and THC which was used to estimate emissions of the Flare. The efficiency estimation was based on the following equation:

$$Eff = \frac{CO2}{CO2 + CO + THC}$$

where:
[CO2] = CO2 concentration
[CO] = CO concentration
[THC] = THC concentration

NOTE: The above equation does not measure control or combustion efficiency. An actual efficiency calculation would include components that the FTIR equipment cannot detect (for example 1,3-butadiene, NO_X, H_2, etc.)

In order to complete these calculations the background concentrations of CO, CO_2, and HC must be compensated. The procedure used to make these compensations is documented in "Combustion Efficiency of Flares" by Pohl, John H., Lee, Joannes, Payne, Roy and Tichenor, Bruce A., *Combustion Science and Technology*, (1986), 50:4, pp. 217 – 231 and in "Evaluation of the Efficiency of Industrial Flares: Test Results", EPA document EPA-600/2-84-095.

IMACC provided the following calculations that were used to estimate errors in efficiency with respect to each term in the PFTIR measurements. The variation in efficiency with each term is given by its partial derivative with respect to each term. This gives:

$$\frac{\delta Eff}{\delta CO}\Delta(CO) = \frac{-CO2}{(CO2+CO+THC)^2}\Delta(CO)$$

$$\frac{\delta Eff}{\delta THC}\Delta(THC) = \frac{-CO2}{(CO2+CO+THC)^2}\Delta(THC)$$

$$\frac{\delta Eff}{\delta CO2}\Delta(CO2) = \frac{(CO+THC)}{(CO2+CO+THC)^2}\Delta(CO2)$$

In each term the $\Delta(x)$ is the error for compound x. Once these terms are evaluated the total error in the efficiency is given by:

$$\sqrt{\left(\frac{\delta Eff}{\delta CO}\Delta CO\right)^2 + \left(\frac{\delta Eff}{\delta CO2}\Delta CO2\right)^2 + \left(\frac{\delta Eff}{\delta THC}\Delta THC\right)^2}$$

The efficiency as estimated by the PFTIR method was determined using the Classical Least Square method of analysis to two significant figures.

Measurements from the FTIR equipment were taken every second and averaged over a five minute period; an efficiency value was generated every five minutes. The samples taken at each operating scenario were averaged to get a representative efficiency for that particular operating scenario.

Anomalies in the data were evaluated before inclusion or exclusion in any analysis, e.g. efficiency values not consistent with other efficiency values in that test run. All of the concentration data reported by the PFTIR analysis has corresponding error measurements. These error values reflect how well the software is able to match the features in the infrared spectrum. By subtracting the scaled reference from the data, this ideally would result in a straight line. Deviations reflect inaccuracy in the measurement. The error bar is a root mean squared residual that can be converted to concentrations using library reference standards. If the data is not at least 2.5 times the value then the data is suspect. For example, IMACC stated that the measurement reported for C_3H_6 concentration of 9.393 ppm on 11/03/09 at 10:46:47 AM is suspect because this value is less than 2.5 times the reported error for that measurement of 4.518 ppm.

IMACC also provided data that estimated the actual temperature at the point of the FTIR focus. This data was used to assess how successful the technicians were in keeping the point of focus of the FTIR sensor at the optimum location in the plume. The calculations employed by the FTIR computer assume the sensor is measuring the plume at 200°C. Therefore, deviations of that temperature from 200°C (used as a basis for the PFTIR analysis) lead to increased magnitude of error in the PFTIR test results. These temperature estimates are located in Appendix C.

4.2 PROCESS DATA

During the evaluation, the following parameters were measured and/or calculated using the existing steam and natural gas flow meters and the Panametrics and stored in the facility's data historian:

- Vent Gas sent to the Flare (in lbs/hr)
- 1,3-butadiene in the Vent Gas sent to the Flare (in lbs/hr)
- Steam flow sent to the Flare (in lbs/hr)
- Net Heating Value of the Vent Gas sent to the Flare (in BTU/scf)
- Natural gas in the vent stream sent to the Flare (in scfh)
- Steam-to-Vent Gas ratio
- NHVFG (in BTU/scf)

In addition, meteorological data and video of the Flare flame were collected and stored on the facility's computer network.

Copies of the monitoring parameters and meteorological data are included in Appendix D.

5.0 QA/QC ACTIVITIES

IMACC calibrated the PFTIR equipment prior to and at the end of each evaluation day. Calibration of the FTIR equipment included instrumental radiance calibration (calibration with a cold target), radiance calibration (calibration with an infrared black body source), and background radiance calibration (sky background). QA/QC audit data sheets are included in Appendix E.

The calibration parameters for the Panametrics (signal strength, etc.) was verified as being within proper ranges prior to, during, and after the PFTIR test period. During discussions between EPA and INEOS ABS concerning the methods used to determine 1,3-butadiene flow rates from the Panametrics data, a couple of problems were identified with the use of the Panametrics data that has led to a re-evaluation of the algorithm previously agreed to by INEOS ABS and the EPA in August 2007. This algorithm is being revised to address these problems. The revisions include development of logic to compensate for errors in the Panametrics estimate of Vent Gas molecular weight due to limitations in detecting nitrogen and the use of an assumed (i.e., constant) nitrogen concentration. GE Sensing has provided INEOS ABS an algorithm that can be used to estimate the errors in molecular weight measurements due to the use of an incorrect assumption for nitrogen composition in the stream. INEOS ABS is using this algorithm to develop a separate algorithm to correct the errors in the originally measured molecular weight. The INEOS ABS algorithm is currently being tested and INEOS ABS expects to complete corrections to the stream composition calculations for the period of the PFTIR by August 6, 2010.

Supplemental natural gas is metered via a thermal gas meter directly into the Flare base. Prior to the PFTIR tests a secondary thermal gas meter was installed in this line. This secondary gas meter indicated a higher flow rate than the original meter at most flow conditions. After the PFTIR testing was completed the original thermal gas meter was removed and sent back to the factory for recalibration. While that meter was out, an additional gas meter of a different design (mass flow meter) was installed in place of the original thermal gas meter. This meter agreed more closely with the newer (secondary) thermal gas meter. Therefore, the supplemental gas flow measurement from the secondary gas meter is considered to be the more accurate of the two meters in use during the PFTIR test period and its values are used in the calculations.

Steam flow to the Flare tip is metered via a vortex shedding meter. Prior to the PFTIR tests a secondary vortex meter was installed in the steam line. The readings from the secondary and the primary steam flow meters agree, therefore the primary steam flow indication is considered accurate for the PFTIR evaluation period.

UNITED STATES, et al.

v.

INEOS ABS (USA) CORPORATION, et al.

C.A. No. 1:09-CV-545

EXHIBITS TO MOTION FOR ENTRY OF FIRST AMENDMENT

EXHIBIT 6

AUGUST 2010 SUPPLEMENTAL PASSIVE FTIR RESULTS

PASSIVE FOURIER TRANSFORM INFRARED TECHNOLOGY (FTIR) EVALUATION OF P001 PROCESS CONTROL DEVICE AT THE INEOS ABS (USA) CORPORATION ADDYSTON, OHIO FACILITY

SUPPLEMENTAL REPORT

August 2010

SUMMARY OF EVALUATION PROGRAM

Pursuant to the Consent Decree (Civil Action No. 1:09-CV-545) between U.S. Environmental Protection Agency (EPA) vs. INEOS ABS (USA) Corporation (INEOS ABS) and LANXESS Corporation, INEOS ABS performed a Passive FTIR evaluation on the P001 Process control device at the INEOS ABS Addyston, Ohio facility. The purpose of the evaluation was to determine the appropriate Net Heating Value of Flare Gas (NHVFG) limit to be used to operate the control device to ensure 99% control efficiency.

The Passive FTIR (PFTIR) evaluation was performed on the P001 process air pollution control device (the Flare). The PFTIR method was used to estimate emissions from the Flare by measuring carbon dioxide (CO_2), carbon monoxide (CO) and total hydrocarbons (THC) in the Flare output stream (the area above the flame of the Flare) at varying operating conditions and NHVFG values. The PFTIR evaluation was a comparative test only as it is still a developing technology for measuring flare emissions.

The EPA has proposed that a NHVFG of 200 British Thermal Units per standard cubic feet (BTU/scf) yields a control efficiency of 99%. This PFTIR evaluation compared environmental performance at different NHVFG values so as to determine the range of NHVFG that provides optimum environmental performance for operation of the Addyston Flare. The Facility's Title V Permit requires the Process P001 Flare to operate at 99% control efficiency.

INEOS ABS contracted with Industrial Monitor and Control Corporation (IMACC) to perform the PFTIR evaluation of the Flare. The test was performed in a timely manner on November 3 through November 5, 2009.

The evaluation pursuant to the Consent Decree was only being used to provide information to the EPA Office of Enforcement and Compliance Assurance (OECA), Director of Air Enforcement of the Office of Civil Enforcement (OCE) to aid in his/her decision in the establishment of a newly defined lower NHVFG limit to be used to control the P001 Process Flare. This evaluation was not used as a means to determine compliance with the Facility's Title V Permit.

OBJECTIVES AND TEST MATRIX

The purpose of the PFTIR evaluation was to determine the appropriate lower NHVFG limit to be used to operate the P001 Process Flare. The PFTIR method was used to estimate the emissions from the Flare by measuring CO_2, CO and THC in the Flare output stream (the area above the flame of the Flare) at varying operating conditions and NHVFG values.

During the evaluation, operating scenarios of the Flare were varied in order to determine which lower NHVFG limit is the most appropriate, i.e. most efficient. Operating scenarios involved varying the flow rates and composition of the stream and the Vent Gas stream. The purpose of this evaluation program was to run multiple scenarios to bracket conditions and to compare emissions at different scenarios. The ultimate goal was to compare the emissions at different scenarios and recommend the future lower limit of NHVFG. It is proposed that any scenarios with lower

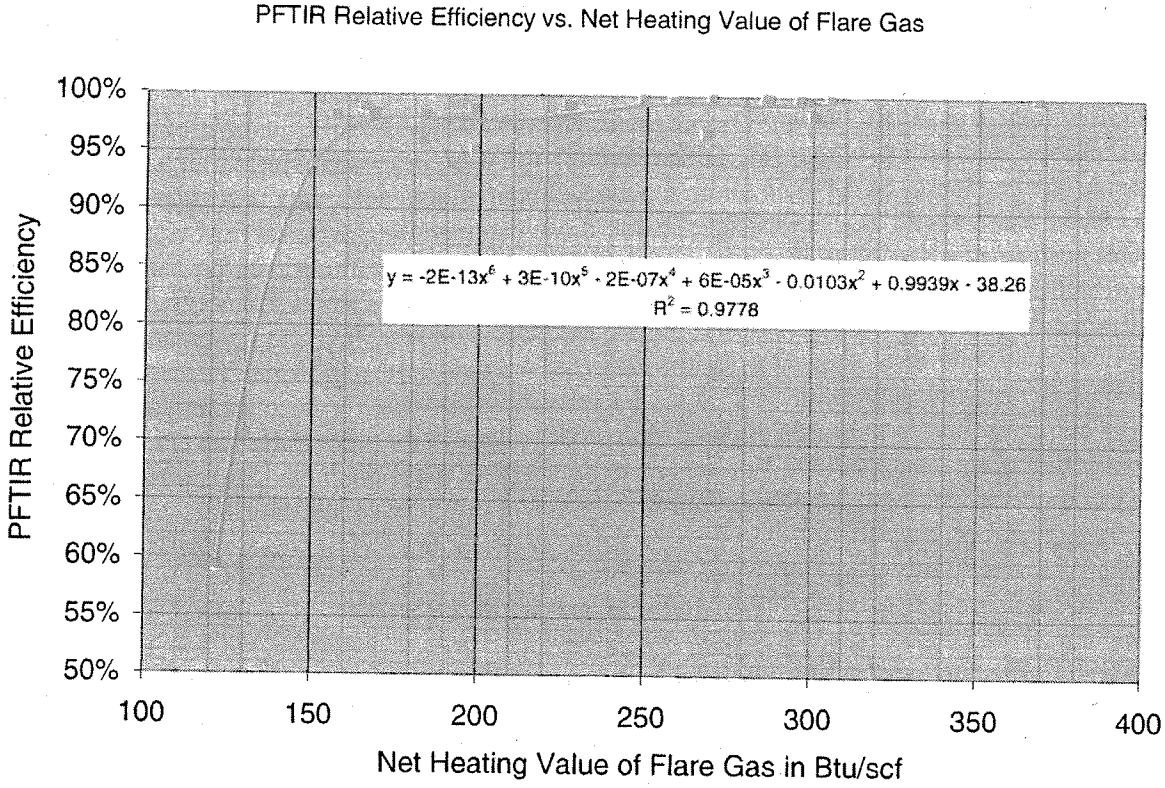
emissions than those seen at the 200 BTU/scf scenarios would be considered to be representative of control efficiency higher than 99% as the EPA has stated that a 200 BTU/scf NHVFG would achieve a 99% efficiency.

Table 3-1 in Appendix A presents the sampling and analytical evaluation matrix that was proposed to be used to help establish the appropriate lower NHVFG limit. The runs were divided into four different flow rates of 1,3-butadiene. Different NHVFG were proposed within each of these flow rates. At the beginning of the evaluation, it became apparent that achieving and keeping steady flows to the Flare would be challenging. Due to these complications, several runs were modified and not performed in the order that was proposed. These runs were modified after consulting and receiving the approval of representatives of the EPA and Hamilton County Department of Environmental Services who were observing the evaluation on site. The modified sampling and analytical evaluation matrix that was followed during the field test is shown in Table 3-2 in Appendix A. All values presented in Tables 3-2 have been corrected to account for the nitrogen content compensation in the calculation of molecular weight of the stream and the corrected calculation of mass flow rate of 1,3-butadiene by the percent mass method. The nitrogen content compensation was completed using a propriety algorithm provided by GE Sensing.

SUMMARY OF RESULTS

The graph in Figure 1 depicts the relationship that was determined between NHVFG and estimated relative efficiency as determined by PFTIR analysis. The individual data points represent the averages of all data collected for each test condition. The solid curve represents a polynomial curve fit with a R^2 confidence of 0.98, which indicates an excellent mathematical model of the data set. Data summary of the exit velocity of the Flare Gas, 1,3-butadiene flow to the Flare, NHVFG of the Flare gas, and the relative efficiency for each test run is summarized in Table 3-3. The raw field data and the calculated NHVFG of each test run are included in Appendix B; the flare monitoring data during the test runs is included in Appendix D.

Figure 1



The shape of the curve in Figure 1 is very similar to the relationships between Lower Heating Values and combustion efficiency established by previous EPA flare studies. These previous EPA flare studies identified that there is a lower limit of the Heating Value of the flare gas that below that value a rapid decline in flare combustion efficiency would occur.

Excerpt from an Article in *Combustion Science and Technology* (50:4, pp. 217-231) titled "Combustion Efficiency of Flares" by John H. Pohl; Joannes Lee; Roy Payne; Bruce A. Tichenor:

> "The conditions which may lead to inefficient combustion in flare flames are graphically shown in Figure 8. The figure was constructed by determining the relative minimum heating value at a given velocity by using the lower 95 percent confidence interval of Figure 5. Figure 8 shows that only one flare flame, operated at a heating value more than 10 percent above the minimum, resulted in combustion efficiencies less than 98 percent. The scatter in the data near the stability limit of the flame is thought to be caused by the difficulty of operating a flame near the stability limit."

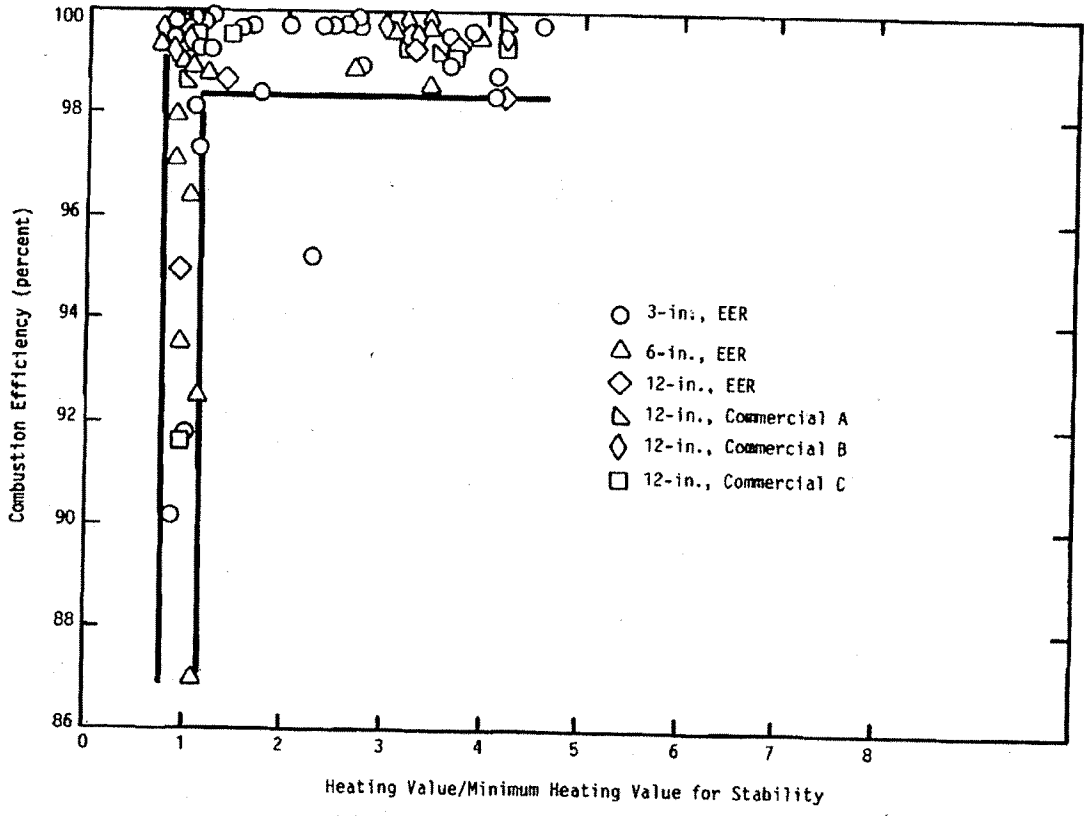
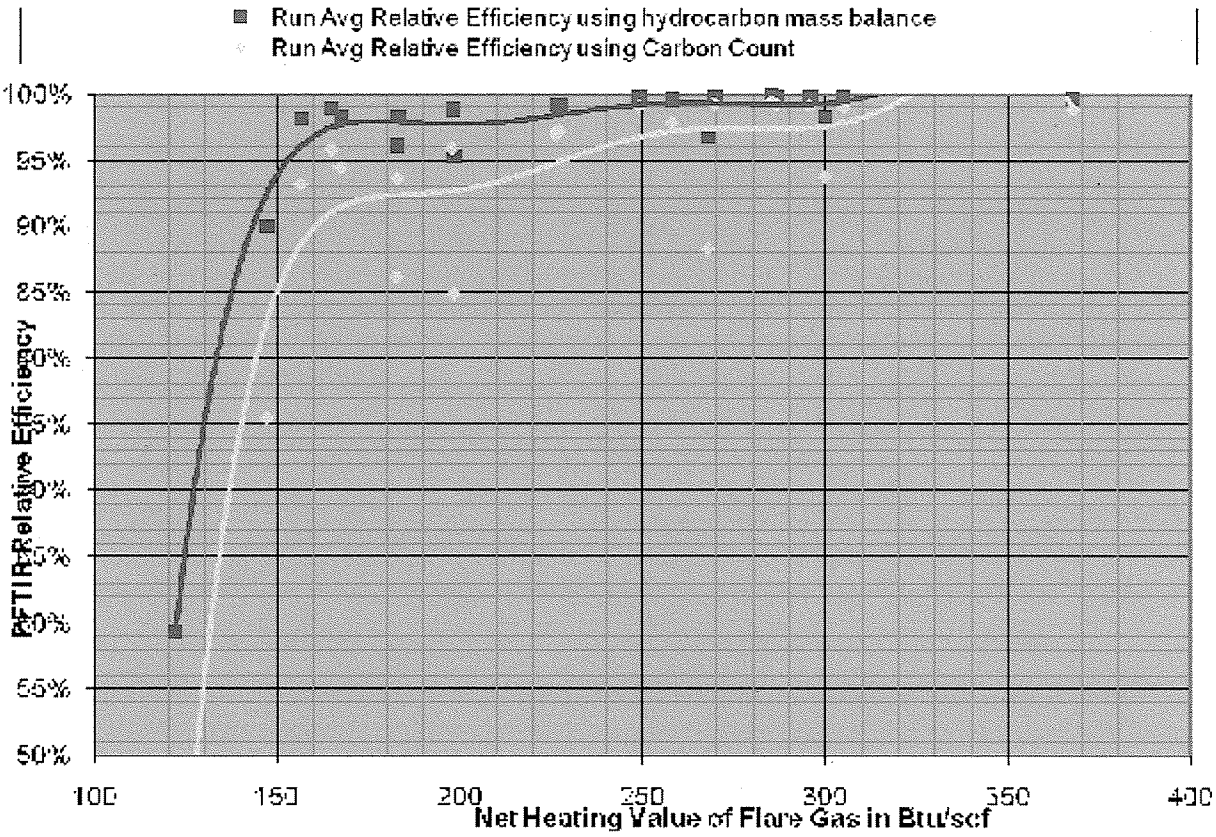


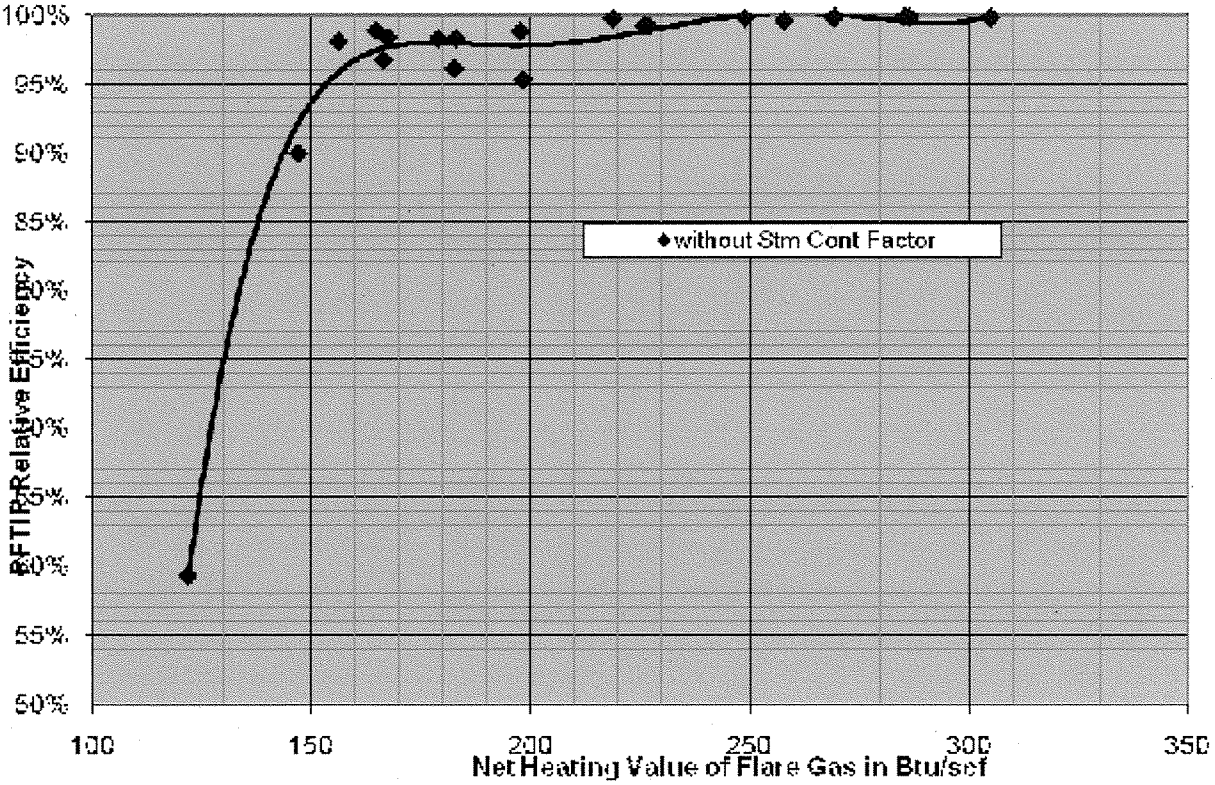
FIGURE 8 Combustion efficiency near the limits of flame stability.

The EPA has proposed that the lower limit for the new NHVFG limit should be 200 BTU/scf in order to assure the required control efficiency. The relative efficiency determined from the polynomial curve fit for the PFTIR data of the Addyston Flare is equivalent from NHVFG values of 169 through 200 BTU/scf. Below a NHVFG of 169 BTU/scf, the model predicts declining efficiency. The EPA study referred to above identified that operation at a level of 110% of the minimum stable Heating Value provided confidence that high combustion efficiencies would be observed. INEOS ABS proposes that a value of 110% of the NHVFG value of 169 BTU/scf, or 186 BTU/scf, is the most appropriate lower NHVFG limit to operate the P001 Process Flare.

Table 3-3 Data Summary Table
INEOS ABS – Addyston, Ohio

Test Run	Proposed Exit Velocity (ft/min)	Actual Exit Velocity During Test Run (ft/min)	Proposed Butadiene Flow (lb/hr)	Actual Butadiene Flow During Test Run (lb/hr)	Proposed NHVFG (BTU/scf)	Actual NHVFG During Test Run (BTU/scf)	PFTIR Estimated Relative Efficiency (%)
1	110	81	300	295	120	183	96.1%
1A	NA	102	NA	325	NA	122	59.3%
1B	NA	119	NA	297	NA	147	89.9%
2	120	135	300	540	200	258	99.6%
3	110	123	300	488	150	198	95.3%
4	160	160	300	543	180	226	99.2%
5	110	121	300	509	230	305	99.8%
6	180	152	600	640	150	198	98.8%
7	270	212	600	763	210	270	99.8%
8	250	177	600	787	190	249	99.8%
9	250	172	600	729	230	285	99.9%
10	75	105	50	41	120	165	98.8%
11	90	115	50	63	200	227	99.2%
12	40	64	50	159	200	295	96.7%
13	90	101	50	73	140	183	98.3%
14	80	87	50	202	160	167	98.3%
15	80	84	50	44	180	156	98.1%
16	90	98	50	171	220	287	99.8%
17	50	60	10	21	140	283	98.2%
17A	NA	54	NA	49	NA	368	99.7%
18	60	81	10	26	200	296	99.8%


Run Avg Relative Efficiency using hydrocarbon mass balance
Run Avg Relative Efficiency using Carbon Count
100%
95%
90%
85%
80%
75%
70%
65%
60%
50%
RFTIR Relative Efficiency
100
150
200
250
300
350
400
Net Heating Value of Flare Gas in Btu/scf


100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%
RFTI Relative Efficiency
without Stm Cont Factor
100
150
200
250
300
350
Net Heating Value of Flare Gas in Btu/scf